ERS-506

Capitalization of Farm Program Benefits into Land Values

ECONOMIC RESEARCH SERVICE □ U.S. DEPARTMENT OF AGRICULTURE

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

SUMMARY

The total capitalized value of farm program benefits was obtained by summing estimated allotment values per acre for crops under the programs. Although the final estimates may be subject to some error, they provide a new perspective on the capitalization process. Short-term program returns were found to represent an important factor in annual returns to labor and management.

In 1970, the total capitalized value of certain program benefits was about $16.5 billion, or 8 percent of the value of farm real estate. Since 1955, land buyers have paid an estimated $5.9 billion to buy program benefits but only $2.7 billion of this amount remained unrecovered in 1970. The difference between unrecovered investment and opportunity value--$14 billion--represents an increment to value above the actual investment of land and allotment owners.

In the past, people have generally assumed that most farm program benefits have been capitalized into land values at rates similar to farm mortgage interest rates. Apparently, more of the short-term earnings go to other factors; perhaps only a third to a half of total short-term earnings accrue to land. Further, the average capitalization rate is probably 1.5 to 3 times the mortgage rate of interest.

CAPITALIZATION OF FARM PROGRAM BENEFITS INTO LAND VALUES

By

Robert D. Reinsel and Ronald D. Krenz
Agricultural Economists
Economic Research Service

INTRODUCTION

The Federal Government supplements U.S. farm income through a variety of price support and direct payment programs, including inducements to limit acreage of selected crops and payments to supplement income. Analysts frequently state that these income benefits tend to become capitalized into farm real estate values or into values of salable allotments.

Numerous studies have shown that producers or potential producers of a commodity will pay more for land and associated production rights to a specific commodity than for land without these rights (1). 1/ Other studies have demonstrated that producers will also pay to acquire commodity production rights separate from land (6). Most such studies have been oriented to a selected commodity. Little attempt has been made to estimate the current total market value of the production rights for all supported commodities.

The specific issues addressed in this report include:

1. The extent to which price and income effects of commodity programs have been capitalized.
2. The differences between commodities in the extent to which program returns are capitalized.
3. The extent to which landowners have paid for the capitalized values of program payments in land purchases.
4. The extent to which nonprogram commodities and nonfarm opportunities affect the capitalization process.

This report summarizes current information on program returns and on the process of capitalization of these returns. Some of the conceptual problems discussed involve measurement of the benefits and the method of capitalization. Although the data used are imperfect and the final estimates may be subject to considerable error, they may provide new insight

---

1/ Underscored numbers in parentheses refer to items in references at the end of this report.

and stimulate further inquiry into the problem of capitalization.

INCOME BENEFITS FROM FARM PROGRAMS

Problems in Estimating Benefits

A number of considerations enter into measuring the net effect of farm programs on farm income and land or allotment values. These include the definition of an acceptable measure of benefits, the impact of programs on income from nonsupported commodities, and the effects of interactions between specific commodity programs.

In this report, the total income effect is defined as the difference between the actual net income of farm operators in 1970 and an estimate of what the net income would have been if programs had been terminated at the beginning of 1970 and farm prices had been determined in a free market. An alternative measure of the income effect would be the difference between the income stream under commodity programs and income after longer term adjustments to the program termination had been made. But the long-term income concept would leave out the short-term structural adjustments. The shock effects of program removal on firms which would make the adjustments would not be included.

No attempt was made to provide income estimates by commodities. Available data and aggregate income models do not provide a basis for the allocation of fixed expenses to the production of specific commodities. Returns to farm operations and to all enterprises within the operations are affected by the supply and price elasticities of commodities. These linkages are not well defined. Then too, feed and livestock relationships cause income from livestock to be higher with farm programs than without, because the programs limit the quantity of feed grains available for livestock feeding. And as a result of the inelastic demand for meat, a small supply of meat produces a large total income to livestock producers. In the long run, a movement to a free market would reduce income in the livestock sector. But to which program should the reduction be attributed? Nonsupported commodities are also affected and any income lost from these enterprises would need to be attributed to specific programs. Because farm commodities are not produced in isolation from each other, the income effects are inseparable without very gross assumptions concerning the allocation of their effects among commodities. Also, even if net income from production of wheat, rice, or some other commodity was known, the net would have to be allocated arbitrarily among the various factors in the production process.

We believe the aggregate income effect shown in this report is a reasonable estimate of the total impact of programs on income. This income effect is well above the amount available for capitalization. Evidence presented later suggests that the amount capitalized is much less than the full short-term income effect.

Estimated Earnings

The total income effect of farm commodity programs presented here is drawn from a revision of estimates in CAED Report 32 (5). This revision was made to reflect 1970 input and output, price, use, and production relationships and should be viewed as an approximation of total

benefits. The estimate is basically in line with the CAED report and with other studies which have produced estimates ranging from $5 to $9 billion under various assumptions.

The total short-term income effect of the 1970 farm price support and acreage control programs is estimated at $6.5 billion. This figure includes direct payments of $3.7 billion and indirect price support returns of $2.8 billion. The $6.5 billion in total effect is the difference between the actual net income of $15.9 billion in 1970 and the estimated short-term free market income of $9.4 billion (table 1). 2/

Table 1.--Farm income by source, production expenses, and net income, actual 1966-70 and 1970, and projected 1970 1/

	Actual 2/		Projected 1970 3/	
	1966-70	1970	Short-term adjustment	Long-term adjustment
	Million dollars			
Crop receipts	18,918	19,636	15,192	16,968
Livestock receipts	26,572	29,595	28,280	26,911
Government payment	3,466	3,717	401	401
Total cash receipts	48,956	52,948	43,873	44,280
Cash expenses 4/	30,623	33,949	32,053	30,100
Net cash receipts	18,333	18,999	11,820	14,180
Depreciation	6,166	6,198	6,600	6,200
Actual cash income	12,167	12,081	5,220	7,980
Farm perquisites 5/	3,383	3,632	3,859	3,859
Inventory change	207	226	332	332
Net farm income	15,757	15,939	9,411	12,171

1/ Under a free market after short- and long-term adjustments.
2/ Income data for 1966-70 and 1970 are from U.S. Department of Agriculture, Farm Income Situation, FIS-218, July 1971.
3/ Income estimate for projected 1970 from (5, table 5, p. 34.) Basic expense item estimates are from the same source with adjustments made for rising farm input prices.
4/ Cash expenses are current operating expenses plus taxes, interest, and rent to landlord.
5/ Value farm products consumed at home and gross rental value of farm dwellings.

2/ Data in the table are revisions of estimates given in CAED Report 32 (5) to reflect 1970 conditions.

Because farm operators tend to base their price expectations on previous prices, output would probably increase in the first year without a program. Also, prices would fall well below those received under the program. Since demand for the supported commodities is fairly inelastic, prices would decline more rapidly than quantities would increase. Thus, the initial impact on gross receipts would be severe.

Lower prices in the first year would be expected to lead to a series of adjustments as high-cost producers, formerly protected under the program, reduce output. Because many of the resources used by such producers have low salvage values, these resources would tend to remain employed in production as long as variable production costs were covered. Adjustment in the production structure would occur only as returns to the combined resources of operators employed in agriculture fell below returns from employment of these resources in the nonfarm sector. For many producers, this relationship implies a long period of production with extremely low returns at a subsistence level of existence.

The $9.4 billion income to farm operators in the first year of a free market implies that high-cost producers would have negative returns (losses) from farm production. Only a few of these producers would immediately leave the production sector because of the capability of farm firms to withstand short-term losses. However, this high-cost group would eventually be forced out of production if returns remained low for an extended period.

Large quantities of land would not be expected to come on the market at once, but for land which did, prices would be expected to decline in areas strongly affected by production control programs.

The longrun adjustment model suggests that crop prices and income would rise from the shortrun level. On the other hand, livestock prices and income would fall as output expanded in response to the reduced cost of grain and additional shifts of land from crop to livestock production. The net effect in the long run is a rise in income from the shortrun level. Moreover, this income would be distributed among a significantly reduced number of farms, affecting farm size and employment.

The impact of program removal on income and land values would be most serious in areas where (1) sales of the supported commodities make up a large part of the agricultural income, (2) agriculture is the main source of employment, and (3) average production costs are high relative to the anticipated free market prices for commodities grown.

DISTRIBUTION OF TOTAL BENEFITS

The distribution of total benefits among the factors of production depends on the price-quantity relationships for both inputs and outputs, nonprogram production alternatives, and nonfarm alternatives for the assets employed. If all factors had equal supply elasticities and were used in fixed proportions, each would receive a proportional share of income with or without programs. On the other hand, if supplies of all inputs except land were perfectly elastic and the land supply perfectly inelastic, all program benefits would be available for land. Neither of these extremes is likely, and program benefits will be shared by the several input factors in some intermediate proportion. Land will receive some part, but perhaps a lesser part of the total.

Determination of returns to factors of production in agriculture is also complicated because most farmers own or provide several of the factors. Rates of payment for individual factors are not established on most farms and allocation of returns becomes somewhat arbitrary.

If the quantity of land available for a particular commodity is reduced, land becomes a more limiting factor in the production process and the marginal value product (MVP) of land increases relative to that of labor and capital--which become underemployed. If there are few alternative uses for labor and capital and their salvage values are very low, it is rational for the operator to acquire more land to employ these resources fully. In the process, the increased revenue from the program is bid into land prices. The extent of capitalization will be reduced if good nonfarm alternatives exist for the underemployed factors, because a farmer may add more to his income by part-time nonfarm employment than by acquiring additional land.

In Michigan, for example, there is ample opportunity to find nonfarm employment within easy commuting distance of the farm home. In such an area, farming might become a part-time occupation and little of the program benefits would be capitalized into land. On the other hand, nonfarm opportunities in North Dakota are relatively scarce and salvage values for farm operator labor tend to be low. Thus, to maintain income and employ labor and capital fully, farmers would attempt to buy more land. As a result, land prices would rise and more of the program benefits would be capitalized into land values.

For those commodities where share rental is important, price increases and certificate payments are shared among tenants and landlords along with the crop. Thus, some portion of direct and indirect benefits goes to the tenant as well as the landlord. In addition, less efficient producers use some part of the benefits to cover variable costs. Without programs, these firms would stop producing because annual incomes would not meet their variable costs.

Variable production costs for cotton, for example, averaged 25 cents per pound in 1969 (8). If cotton prices were to fall below this level--which would be expected in a free market--a large number of producers would have to discontinue production.

Annual returns to land or allotments from programs can thus be viewed as a single factor in a general equilibrium framework in which all factors' returns are simultaneously determined. Empirical evidence of the stream of annual earnings to land is available only under those programs and in those States where allotments are transferable through lease arrangements and markets have been established for allotments.

The following section discusses the concept of capitalization. Understanding the process and the estimates of variables in the models will provide a background for the estimated values that appear later.

ALTERNATIVE CAPITALIZATION MODELS

The capitalization process assumes that buyers of an asset have evaluated the stream of earnings that will accrue to an asset over time and that they will pay no more than the expected value of this income stream discounted to the present. Buyers are also assumed to partition returns among factors of production.

Land buyers in any year would, therefore, estimate the expected income flow from land and discount to a present value. This income flow might include a factor for satisfaction from ownership or for capital gains income received in the last year of ownership, as well as production income.

If the income flow is expected to be fairly even and certain, the problem of discounting can be reduced to a rather simple formula. However, if a great deal of uncertainty is associated with the expectation and the flow is irregular, discounting is more complex.

The capitalization process can be summarized by the formula:

$$(1) \quad V = \sum_{t=1}^{n} \frac{a_t}{(1+r_t)^n}$$

Where V = present value
n = time horizon
t = year within the horizon
a_t = annual income in year t
r_t = discount rate in year t

If a_t and r_t are constant and known with certainty, the formula reduces to (2) $V = \frac{a}{r}$ for an infinite time horizon. And, for all practical purposes, any horizon over 30 years can be assumed to be infinity. (Limitations of this assumption are explained in the section "Time Horizon.")

However, if a and r are increasing, decreasing, or irregular, but known with certainty, the formula must be as in (1).

Introducing the concept of expectations, the formula becomes:

$$(3) \quad V = \sum_{t=1}^{n} \frac{E(a_t)}{(1 + E(r_t))^n}$$

Where $E(a_t)$ = expected value of a_t
$E(r_t)$ = expected value of r_t

In this framework, we are concerned with the stream of future returns and discount rates. Because these are unknown, expectations tend to be based on experience which is projected into the future. Thus, it is inferred that $\frac{a_{(t-1)} + \ldots + a_{(t-m)}}{m}$ is a suitable proxy for $E(a_t)$. A similar assumption is made with respect to $E(r_t)$ and the problem becomes one of determining the validity and certainty of the assumption.

Variables in the Models

Annual Earnings

One method of determining annual earnings available for capitalization is to measure the lease rate for allotments. Annual payments for rent reflect the best judgment of operators and allotment owners about the contribution of farm programs to income. Currently, however, allotments can be rented only within limited geographic areas. Thus, the annual rents might be lower than if allotments were freely rented across county and State lines. In addition, annual rents reflect the increment to earnings above returns from other crops that could be produced. These returns from other crops would be higher than in a free market situation. Thus, the rental rate for a single-commodity allotment will be reduced.

An alternative to market rental values is to use residual estimates of returns to allotments, but this method seems less likely to provide useful information. The major problem in making residual estimates is partitioning returns among land, labor, capital, and allotments. The partitioning process seems to misrepresent the way the farm operator views his returns. Because land, labor, and capital generally are controlled or owned by one farm producer, he is concerned with the aggregate return to the bundle of factors versus the aggregate return to the same bundle in some other use. His decisions are based on the flow of income in total and not on the separate return from each asset.

Time Horizon

In most studies of the capitalized value of allotments and in most references to the capitalization process, researchers have assumed a horizon of infinity. The formula is easy to use and the available data do not usually lend themselves to more complex formulas. However, use of this simple framework has tended to limit thinking concerning capitalization.

First, it is generally assumed that, in the perpetuity formula, program benefits will be the same every year and buyers in any future year would pay the same price for these benefits as current buyers. Second, no recovery of investment is assumed except at the termination of ownership. Also, a frequent assumption is that benefits from the program are lost to later purchasers (who did not own production rights at the beginning of the program).

In reality, allotment buyers are likely to have time horizons of less than 30 years. With uncertainty surrounding a program, buyers may be unwilling to consider allotment returns as an income factor for a period of more than 10 to 15 years. Sometimes the period may be as short as 3 or 4 years if significant changes are occurring in the program.

The shortness of the time horizon is reflected in the capitalization rates implied by the annual program rents and market values for allotments. The higher the implied capitalization rate, the less the weight given to future earnings. For example, assuming a capitalization rate of 25 percent, about 95 percent of the value could be recovered in 15 years. At a capitalization rate of 5 percent, only 53 percent is recovered in 15 years. Not only is the perpetuity value higher with a lower discount rate, but the recovery period is longer. If the recovery period is fixed, the capitalized value is reduced to the level specified by the time horizon.

Raising the capitalization rate not only lowers the discounted value of the income stream but also shortens the recovery period substantially. Thus, although a buyer may assume that programs will continue over a long period, he may be unwilling to risk much on this assumption.

For example, a person who believes there is a low degree of risk may capitalize program benefits at a 5-percent rate of return. If benefits are capitalized at this rate for 15 years, an income of $50 in the last year is worth $25 when the investment is made (table 2). However, at a rate of 25 percent, it is only worth $1.50.

Discount Rates

The only method available for estimating discount rates from market data is to compare sales prices and lease rates for allotments. We have such observations for cotton, peanuts, and rice.

In a few cases, discount rates have been estimated by using regression techniques to arrive at the market value of an acre of allotment and by using other data to determine the added income from an additional acre of allotment. Comparisons of incomes and values have been used to develop ranges for capitalization rates for varying sizes of firms.

Under the assumption that programs have a fairly high uncertainty factor and may therefore have a short time horizon and high discount rate, we can set up a hypothetical model that will provide additional information on program benefits. For example, at the beginning of the first year of a 3-year program, the land buyer knows that the program will continue for 3 years and this income may be discounted at the same rate as other farm income. He associates more uncertainty with the second 3 years and further uncertainty with later years and programs.

It seems logical then to establish a framework for discounting program benefits that incorporates this knowledge. As a start, the mortgage rate of interest can be taken as the discount rate for the first 3 years. For each succeeding 3-year period, an additional 3 to 5 percent is added to the original rate. Once the time horizon and discount rate for each period have been estimated, such a system can be converted to a perpetuity income stream and compared with market observations.

Present Value

Theoretically, the present value of any capital asset is determined by discounting the future income stream. Elsewhere in this report, some of the problems in applying the discounting procedure have been considered. In this section, various methods of estimating present value of land or allotments will be considered.

Market value of allotments.--The most obvious choice for measuring value is the price paid for an acre of allotment. This choice assumes that buyers are in some way able to use the discounting process in establishing a present value for allotments.

In a competitive market, the value established should closely approximate the present value of future economic returns from the allotment. However, available observations of market value are constrained because markets are limited to States and counties. In addition, the market for allotments for a specific crop is affected by the existence

Table 2.--Annual rent of $50 capitalized at 5, 15, and 25 percent with cumulated recovery and percentage recovery, by years 1/

Year	Discount rate								
	5 percent			15 percent			25 percent		
	Present value	Cumulated present value		Present value	Cumulated present value		Present value	Cumulated present value	
	Dol.	Dol.	Pct.	Dol.	Dol.	Pct.	Dol.	Dol.	Pct.
1	47.50	47.50	4.75	43.00	43.00	12.91	40.00	40.00	20.00
2	45.00	92.50	9.25	37.50	80.50	24.18	32.00	72.00	36.00
3	43.00	135.50	13.55	33.00	113.50	34.08	25.50	97.50	48.75
4	41.50	177.50	17.70	28.50	142.00	42.64	20.50	118.00	59.00
5	39.50	216.50	21.65	25.00	167.00	50.15	16.50	134.50	67.25
6	37.50	254.00	25.40	22.00	189.00	56.76	13.00	147.50	73.75
7	36.00	290.00	29.00	19.00	208.00	62.46	10.50	158.00	79.00
8	34.50	324.50	32.45	16.50	224.50	67.42	8.00	166.00	83.00
9	33.00	357.50	35.75	14.00	238.50	71.62	6.50	172.50	86.25
10	31.50	389.00	38.90	12.50	251.00	75.38	5.00	177.50	88.75
11	30.00	419.00	41.90	10.50	261.50	78.53	4.00	181.50	90.75
12	28.50	447.50	44.75	9.50	271.00	81.38	3.00	184.50	92.25
13	27.50	475.00	47.50	8.00	279.00	83.78	2.50	187.00	93.50
14	26.00	501.00	50.10	7.00	286.00	85.89	2.00	189.00	94.50
15	25.00	526.00	52.60	6.00	292.00	87.69	1.50	190.50	95.25
∞		1,000.00			333.00			200.00	

1/ Data shown are computed by the formula $V = \frac{a_t}{(1+r_t)^n}$ and rounded to the nearest half-dollar.

of other farm programs which raise the opportunity value of production from alternative crops. The increment to income from a single program is less, with other programs in existence, than if there were only one program.

Market values of allotments may tend to be lower than the opportunity values because allotments are typically transferred from low- to high-productivity areas. Thus, market prices may reflect more of the opportunity value of production to the seller than to the buyer who may have some income surplus that cannot be measured in the market.

Regression estimates.--As an alternative to observing sales of allotments, regression techniques have been used for some commodities to estimate the contribution of an additional acre of allotment to land value. Making these estimates requires independent variables in the equation, some degree of variation of allotments in relation to acreage, and a large number of observations to isolate the impact of variations in allotment acreage on land values. Previous studies in this area have provided little information that can be accepted with any certainty because of the serious intercorrelation problems that exist between variables and the difficulties involved in collecting sufficient data.

Capitalization of rents.--A third alternative for estimating present value is to select a capitalization rate and capitalize the annual rental value of allotments. The capitalization rate may be drawn from observations of other programs or assumed from alternative investments in financial markets. This method can provide a general idea of the capitalized value, but precludes the possibility of setting confidence intervals around the estimated value. We cannot document the true linkage between farm income and land value, but an estimate of that linkage can be made by using available empirical data and qualitative judgments of informed researchers.

Changes in program benefits resulting from changes in legislation or administrative interpretation can cause significant shifts in the expectations of allotment owners or potential buyers. Thus, although the overall effect of a program throughout time may be to stabilize income, marginal changes in programs or program administration can cause much uncertainty about benefits. As a result, the capitalized value of the income stream is affected.

CAPITALIZED VALUES

The process by which program benefits are capitalized is the same for each commodity, yet the extent of capitalization may be quite different. That is, for any capitalization to occur, some part of income must be available as income (rent) to land or allotments. This income may come from diversion payments, marketing certificates, or indirect transfers from consumers through higher prices. Although a dollar of income from any source would have some effect on land value, producers' expectations about the certainty and stability of the income stream will directly affect the discount rates they use to capitalize income.

Differences in farm programs and in the ability of firms to acquire or dispose of allotments or production rights may also cause substantial differences in producers' expectations about future income. Evidence of the value of allotments and differences in capitalized values and

capitalization rates for rice, cotton, peanuts, and tobacco are provided in the next section. Estimates of capitalized values for wheat and feed grains are based on capitalization rates for cotton. For wheat and feed grains, direct payments are assumed to be a suitable proxy for land returns from the farm program.

Cotton

Data from the 1966 Cotton Cost Survey show that cotton allotment buyers were willing to pay from $0.12 to $0.27 per pound (table 3). In the same year, lease rates for cotton allotments ranged from $0.03 to $0.06 per pound. Rent-to-value ratios (implied discount rates) for allotments ranged from 17 to 40 percent, substantially above the market rate of interest for mortgages. Capitalization rates averaged 21 percent for the entire country. These data support the hypothesis that farm program benefits have been heavily discounted. Perhaps one of the major factors associated with the cotton program is the great degree of uncertainty and the frequent changes in program regulations.

If all allotment acres had been rented at the rates prevailing in 1970, rental payments would have totaled $316 million (table 4). In 1970, direct payments to cotton producers totaled $919 million. Thus, annual income to allotments, and indirectly to land, made up about a third of the direct benefits.

The implication is that most of the returns from the cotton program--two thirds of direct payments and all indirect benefits--are available for other production factors. Cost-of-production estimates show that many cotton producers are apparently relying on program benefits to cover variable production costs (8). Payments used in this way are not available for capitalization.

The cotton program is unique because it is the only program with transferable allotments and direct payments to producers. Rice and peanut programs have transferable allotments but no direct payments. Feed grain and wheat programs have direct payments but these are not transferable separately from land; and tobacco allotments can be leased but not sold.

Peanuts

Data from a 1968 survey made to obtain the value of peanut allotments show a national average capitalization rate of 12.5 percent, compared with 21 percent for cotton (table 5) (6). Apparently, peanut program benefits are more certain and producers more confident that benefits will be continued. No comparison can be made with direct payments. However, if all allotments were rented at the indicated rates, the rental income (cost) from the program would be about $75.3 million.

Rice

Although data on rice allotment values are scant, capitalization rates were about 11 percent in 1970 (2,4). The rice program has, in general, been about as stable as the peanut program and the implied capitalization rates are similar (table 6).

Table 3.--Cotton allotments: Prices, rents, and implied capitalization rates, selected States, 1966

State	Purchases		Rentals		Implied capitalization rate
	Observations	Price per pound	Observations	Price per pound	
	Number	Dollars	Number	Dollars	Percent
North Carolina	10	0.12	14	0.04	33
South Carolina	5	.15	25	.06	40
Georgia	25	.12	43	.03	25
Alabama	32	.18	101	.04	22
Tennessee	4	.27	24	.05	19
Mississippi	7	.23	52	.05	22
Arkansas	19	.22	35	.05	23
Louisiana	3	.20	3	.04	20
Oklahoma	2	.13	6	.04	31
Texas	49	.23	159	.04	17
New Mexico	1	.24	6	.06	25
Arizona	1	.25	19	.06	25
California	13	.26	40	.05	19

Source: Unpublished data from 1966 Cotton Cost Survey, Econ. Res. Serv., U. S. Dept. Agr.

Table 4.--Cotton: Allotment values and rents, and direct payments, selected States, 1970

State	Allotments					Direct payments 4/
	Acreage 1/	Value per acre 2/	Total value	Rent per acre 3/	Total rent	
	Acres	Dollars	1,000 dollars	Dollars	1,000 dollars	1,000 dollars
Illinois	2,871	44.28	127	14.76	41	5/
Missouri	380,295	136.85	52,043	29.75	11,314	22,449
Kansas	51	30.81	5/	9.48	5/	5/
Virginia	17,112	44.28	758	14.76	253	432
North Carolina	469,240	44.28	20,778	14.76	6,926	14,451
Kentucky	7,295	44.28	323	14.76	108	465
Tennessee	569,489	142.83	81,340	26.45	15,063	34,854
South Carolina	688,519	54.75	37,696	21.90	15,079	32,819
Georgia	817,929	46.68	38,181	11.67	9,545	37,503
Florida	33,924	46.68	1,584	11.67	395	1,088
Alabama	965,800	84.24	81,359	19.12	18,466	49,296
Mississippi	1,596,829	136.85	218,526	29.75	47,506	122,623
Arkansas	1,378,146	110.22	151,899	25.05	34,523	79,578
Louisiana	569,983	110.60	63,040	22.12	12,608	40,410
Oklahoma	755,601	30.81	23,280	9.48	7,163	24,317
Texas	6,857,326	68.31	468,523	11.88	81,465	308,488
New Mexico	181,185	117.60	21,307	29.40	5,327	14,425
Arizona	344,632	224.00	77,198	53.76	18,527	44,403
Nevada	3,637	117.60	428	29.40	107	346
California	774,376	213.72	165,498	41.10	31,826	89,922
United States	---	---	1,503,788	---	316,243	919,002

1/ Acreage allotments in 1970.
2/ 1966 data on value per pound and 1969-71 average harvested yield.
3/ 1966 data on rent per pound and 1969-71 average harvested yield.
4/ Direct payments in 1970.
5/ Negligible.

Source: Unpublished data from 1966 Cotton Cost Survey, Econ. Res. Serv., U. S. Dept. Agr.

Table 5.--Peanut allotments: Values and rents per pound and acre, ratios of rent to value, and total values and rents, 1970

State	Acres 1/	Yield per acre 1/	Price per pound 2/	Rent per pound 2/	Value per acre	Rent per acre	Ratio of rent to value	Total value	Total rent
	Acres	Pounds	Dollars	Dollars	Dollars	Dollars		1,000 dollars	1,000 dollars
Missouri	247	2,670	0.20	0.028	534	74.76	0.14	132	18
Virginia	104,929	3,060	.20	.028	612	85.68	.14	64,217	8,990
North Carolina	167,975	2,670	.28	.026	748	69.42	.09	125,645	11,661
Tennessee	3,614	1,880	.11	.012	207	22.56	.11	748	82
South Carolina	13,909	1,880	.05	.012	102	22.56	.22	1,419	314
Georgia	529,744	2,220	.18	.024	400	53.28	.12	211,898	28,224
Florida	55,535	2,075	.14	.022	291	45.65	.16	16,161	2,535
Alabama	216,962	1,660	.11	.012	183	19.92	.11	39,704	4,329
Mississippi	7,501	1,100	.11	.012	121	13.20	.11	908	99
Arkansas	4,188	1,100	.11	.012	121	13.20	.11	507	55
Louisiana	1,947	1,100	.11	.012	121	13.20	.11	236	26
Oklahoma	138,427	1,655	.15	.025	248	41.38	.17	34,330	5,728
Texas	357,885	1,405	.20	.025	281	35.12	.12	100,566	12,569
New Mexico	8,333	2,230	.20	.030	446	66.90	.15	3,717	557
Arizona	762	2,230	.15	.025	334	55.75	.17	255	42
California	931	2,230	.15	.025	334	55.75	.17	311	51
United States	---	---	---	---	---	---	---	600,754	75,280

1/ Acreage allotments and yields in 1970.
2/ Prices and rents developed from (6).

Table 6.--Rice allotments: Acreage and value, selected States, 1970

State	Acreage	Value per acre 1/	Total value
	Acres	Dollars	1,000 dollars
Illinois	22	240	5
Missouri	5,286	240	1,269
North Carolina	43	240	10
Tennessee	575	240	138
South Carolina	3,163	240	759
Florida	1,063	240	255
Mississippi	51,858	240	12,446
Arkansas	443,331	240	106,399
Louisiana	527,761	240	126,663
Oklahoma	166	240	40
Texas	469,211	240	112,610
Arizona	254	240	61
California	333,054	400	133,222
Total	1,835,787	---	493,877

1/ Average value for transferable allotments in Texas applied to all States except California.

Since 1962, the rice program has remained essentially unchanged except for variations in allotment levels. A unique characteristic is that in Texas, California, and parts of Louisiana, allotments can be transferred separately from land. In other States, allotments are tied to specific tracts. Thus, although allotments have a value in and of themselves, land values should be relatively unaffected by the program in producer allotment States. However, when purchased, allotments assume a real value to the owner and he would suffer a substantial capital loss if the program was discontinued.

Tobacco

Tobacco allotments have not been transferable by sale but can be leased within counties. Allotment values have been estimated at $3,000 per acre--the difference between the value of land with and without a tobacco allotment (table 7) (1,7).

MVP's for allotments have also been estimated through linear programing and compared with estimated market values. These estimates

Table 7.--Tobacco allotments: Acreage and value, selected States, 1970

State	Acreage	Value per acre 1/	Total value
	Acres	Dollars	1,000 dollars
New York	7	3,000	21
Pennsylvania	120	3,000	360
Minnesota	112	3,000	336
Ohio	8,596	3,000	25,788
Indiana	14,536	3,000	43,680
Illinois	3	3,000	9
Iowa	7	3,000	21
Missouri	2,390	3,000	7,170
Kansas	56	3,000	168
Virginia	80,737	3,000	242,222
West Virginia	2,253	3,000	6,759
North Carolina	389,211	3,000	1,167,633
Kentucky	168,255	3,000	504,765
Tennessee	65,941	3,000	197,823
South Carolina	67,164	3,000	201,823
Georgia	58,963	3,000	176,889
Florida	12,319	3,000	36,957
Alabama	584	3,000	1,752
Arkansas	35	3,000	105
Total	871,289	---	2,614,281

1/ Allotment values estimated for flue-cured tobacco in North Carolina were used for all types of tobacco.

imply capitalization rates of 12 percent or more, depending on the time period for the study and the techniques used.

Some evidence suggests that capitalization rates for tobacco have been declining over time. However, they remain high in relation to market interest rates for money

Wheat and Feed Grains

Market estimates of capitalized values for wheat and feed grains are not available. However, benefits under the wheat and feed grain programs probably are capitalized at rates close to those for cotton because all three programs have about the same year-to-year stability.

Direct payments under the wheat and feed grain programs capitalized at 21 percent (the average rate for cotton) yield estimates of about $4.1 billion for wheat and $7.2 billion for feed grains. Such a procedure assumes that direct payments represent the equivalent of total returns to land from both the indirect benefits obtained through the marketplace and the direct payments.

These estimates may represent too high a capitalized value for the wheat and feed grain programs (3). In a speech before the Senate Appropriation Subcommittee on June 4, 1969, Secretary of Agriculture Hardin provided data which suggest that approximately 89 percent of direct payments to feed grain producers in 1968 were for resource adjustment and only 11 percent represented an income supplement. 3/ For wheat producers, 51 percent of the payments were for resource adjustment and 49 percent were for income supplement, compared with 35 and 65 percent for cotton. Because a smaller part of the feed grain and wheat payments was attributed to added income, the amount of income assumed to be capitalized may thus be too high.

The resource adjustment or diversion payment would of itself only compensate the producer for income foregone; land values would not increase. But the income supplement would be available for partitioning among land, labor, and capital. If the direct income supplement is used instead of total direct benefits to measure the land return from the program, the capitalized value for wheat would be halved and the value for feed grains would be reduced to 11 percent of the $7.2 billion estimated. However, in using such a procedure we assume that only the income supplement from direct payments is available to land and that no unmeasured indirect benefits are capitalized. Thus, estimates based on only the income supplement part of the direct payments would probably set the lower range of capitalized value for the two programs.

True capitalized values for wheat and feed grains probably would lie between the estimates based on total direct payments and the estimates based on the direct income supplement.

Because wheat allotments and feed grain bases are not transferable, no values of these allotments or bases separated from land values are observable. Theoretically, one could observe differences in sizes of allotments on similar tracts of land, as has been done with tobacco.

3/ Resource adjustment is a payment in lieu of production.

However, differences in ratios of allotments to cropland are probably not large enough to allow measurement. Since the wheat and feed grain programs have been established, county Agricultural Stabilization and Conservation Service committees, which set and administer allotments and programs, have responded to appeals from producers to equalize allotments. Over time, differences in ratios of allotments to cropland have been gradually reduced so that in any given area, the range in these ratios is very small, too small to permit measurement of value. In regions in which grain acreage is a small proportion of total cropland, other crops are more important determinants of land values.

The current wheat and feed grain set-aside programs contain features that would make a given allotment or base take on different values to different producers. Under these programs, there are two main types of benefits; direct payments in the form of wheat certificates and set-aside payments, and indirect payments through loan rates or supported market prices.

The flexibility of these programs permits wheat or feed grain production on many more acres besides the allotment acres. All production is eligible for the price support once the minimum set-aside provision has been met. Hence, the first increment of wheat allotment or feed grain base is worth much more to a producer than second or later increments.

Before the set-aside program, participation rates in the feed grain programs were low compared with those in other programs. In some States and years, only one-half to two-thirds of the eligible feed grain acreage were in the program. However, producers who did not participate in diversion could also gain the benefits of a stabilized and supported market price. In fact, by not participating, they may have gained more through price support benefits and reduced production than if they had entered the program and received the direct payments.

Benefits to Producers of Nonallotment or Nonsupported Crops

Commodity Credit Corporation (CCC) loan rates have been established for several nonallotment crops including oats, flax, and soybeans. For these crops, no direct payments are available but prices are supported through CCC loans. Hence, producers of these crops obtain benefits from the program although they have no allotments. If any benefits are capitalized into asset values, such values accrue to the land or other factors but are not measurable in terms of allotment value.

For a number of other agricultural commodities, loan rates are not available but prices are obviously affected by the total commodity program system. Prices of livestock are significantly affected by the price support systems, although no direct support prices apply to livestock. Probably some portion of the benefits thus derived is capitalized into rangeland values.

Total Capitalized Value of Farm Programs

The various estimates for commodities add to a total capitalized value of benefits associated with land resources of $16.5 billion, about 7.9 percent of the value of all farm real estate in 1970 (table 8).

Table 8.--Capitalized values of farm program benefits, United States, 1970 1/

Region	Cotton 2/	Tobacco 3/	Peanuts 4/	Rice 5/	Wheat 6/	Feed grain 6/	Total values	
							All listed programs	As percentage of real estate value
	1,000 dollars							Percent
Northeast	---	381	---	---	75,300	147,533	223,214	2.04
Lake States	---	336	---	---	173,519	928,663	1,102,518	7.21
Corn Belt	52,170	76,668	132	1,274	444,519	2,790,105	3,364,868	6.96
Northern Plains	---	168	---	---	1,703,471	1,357,352	3,060,991	13.78
Appalachian	103,199	2,119,202	190,610	148	57,604	492,104	2,962,867	19.39
Southeast	158,820	417,421	269,182	1,014	23,081	359,833	1,229,351	9.02
Delta States	433,465	105	1,651	245,508	9,543	89,624	776,896	6.11
Southern Plains	491,703	---	134,896	112,650	602,076	720,333	2,061,658	7.73
Mountain	98,933	---	3,972	61	717,872	213,256	1,034,094	6.23
Pacific	165,498	---	311	133,222	342,853	65,453	707,337	2.67
United States	1,503,788	2,614,281	600,754	493,877	4,149,838	7,161,256	16,523,794	7.94

1/ State data shown in the appendix.
2/ Based on estimates from 1966 Cotton Cost Survey data on transfer prices per pound of allotment.
3/ Per acre values estimated at $3,000; see (1).
4/ Based on (6).
5/ Based on (4).
6/ Direct payments capitalized at 21 percent, the average rate for cotton.

ALLOTMENT PURCHASES

Thus far, the opportunity value of benefits from the 1970 programs has been analyzed. 4/. We have not discussed farmers' actual payments to acquire program benefits over time. However, this knowledge is essential in understanding the program payment problem because only a small part of the total opportunity value was really purchased.

Each year, $4 billion to $5 billion is spent for real estate and these purchases represent about 2 percent of the land in farms (table 9). Some part of this expenditure is for the rights to program benefits. Assuming that programs have never represented more of the total value of real estate than in 1970--7.9 percent--the upper limit of what was paid to acquire benefits can be estimated. The estimate is obtained by multiplying the value of land transferred in any 1 year by 7.9 percent and summing over the years of purchase. If the true capitalization rate for benefits is 15 percent or higher, a land buyer would, in 15 years or less, recover 90 percent or more of what he paid. Thus, those who purchased benefits more than 15 years ago (before 1955) have, for all practical purposes, recovered their investment. Because of the appreciation in asset value that has occurred, they are, in fact, receiving a windfall stream of income.

Firms who have purchased land since 1955 may incur some losses. The more recent the year of purchase, the greater the actual loss to purchasers if farm programs are ended. However, if all unrecovered investment since 1955 is summed, it amounts to only $2.7 billion, or slightly less than a year's direct payments to program recipients. This figure represents the actual dollars of investment paid for benefits but not yet recovered. The difference between the $16.5 billion opportunity value shown in table 8 and the $2.7 billion unrecovered investment represents an increment in value above the actual investment of land and allotment owners.

IMPLICATIONS

Although the estimates of farm program benefits and capitalized values presented here have some shortcomings, they provide an approximation of the impact of farm programs on incomes and land values. It is hoped they will also stimulate a more rigorous analysis of capitalization.

Many people have assumed that most program benefits were capitalized into land values. In addition, benefits were thought to be lost to operators who purchased land after programs had been established. Also, benefits were believed to be capitalized in perpetuity at relatively low rates and effects of program removal were thought to include very large capital losses to landowners.

Although this analysis does not completely refute these beliefs, the impact of programs on land values and landowners may be much less severe. The relatively high capitalization rates shown seem to imply a

---

4/ Opportunity value is defined as the value of benefit determined as though all investment decisions were made at the beginning of 1970.

Table 9.--Values of land transferred, values of benefits purchased, and unrecovered values, 1970 1/

Year	Land transferred	Benefits purchased	Benefits remaining in 1970
	Million dollars		
1955	3,970	314	39
1956	4,349	344	49
1957	4,299	340	55
1958	4,375	345	65
1959	4,580	362	78
1960	4,516	357	95
1961	4,296	339	96
1962	4,527	358	117
1963	4,503	356	134
1964	4,843	383	166
1965	4,845	383	191
1966	5,207	411	235
1967	5,366	424	279
1968	5,370	424	321
1969	5,180	409	356
1970	5,264	415	415
Total	---	5,964	2,691

1/ Capitalized values in each year are assumed equal to 7.9 percent of the value of farm real estate estimated for 1970. These values are discounted at 15 percent. This rate was chosen because it lies between the average rate for cotton and the average rate for peanuts, rice, and tobacco.

great degree of uncertainty concerning program returns. Cost of production data for cotton also show that some part of the benefits is used to purchase annual production inputs, and rental data demonstrate that a significant part of the short-term earnings goes to labor and management.

This analysis has been largely concerned with the opportunity value of program benefits, or the amount farm operators would have paid to acquire their benefits if all investment decisions had been made in 1970. That is, how much would farmers have been willing to pay to purchase the expected income stream from the program? In a competitive market, this value should be equal to the discounted present value of the future income stream. However, the market for allotments and program benefits is not fully competitive and some surplus is available to the buyers of allotments. Thus, more than the estimated opportunity value of $16.7 billion may be needed to buy the stream of benefits from all operators.

If farm programs were eliminated and producers were compensated for the loss of program benefits, they would need to be compensated more than the amount capitalized into land values. Farmers would also need to be reimbursed for the reduction in earnings from their labor and capital; and the impact on labor and capital is much more important than commonly thought. That is, much of the income stream is used to pay factors other than land; and the impact on annual earnings from these factors could be quite severe.

Although the capitalized value of program benefits on an opportunity basis is rather large--8 percent of the total value of real estate--the actual investment of landowners in program rights seems small. The implication is that if farm programs were discontinued, land values would fall. However, the actual investment losses would be only about $3 billion, or less than 1 year's direct payments.

APPENDIX TABLE

Capitalized value of farm program benefits, 1970

State and region	Cotton 1/	Tobacco 2/	Peanuts 3/	Rice 4/	Wheat 5/	Feed grain 5/	Total values: All listed programs	Total values: As percentage of real estate value
	1,000 dollars							Percent
Maine	---	---	---	---	14	319	333	0.12
New Hampshire	---	---	---	---	---	238	238	.20
Vermont	---	---	---	---	---	819	819	.23
Massachusetts	---	---	---	---	---	367	367	.11
Rhode Island	---	---	---	---	---	14	14	.03
Connecticut	---	---	---	---	---	757	757	.19
New York	---	21	---	---	31,276	43,971	75,268	2.76
New Jersey	---	---	---	---	3,748	12,700	16,448	1.80
Pennsylvania	---	360	---	---	28,876	61,586	90,822	2.59
Delaware	---	---	---	---	1,800	4,657	6,457	2.14
Maryland	---	---	---	---	9,586	22,105	31,691	1.61
Northeast	---	381	---	---	75,300	147,533	223,214	2.04
Michigan	---	---	---	---	97,557	157,648	255,205	6.40
Wisconsin	---	---	---	---	3,129	199,410	202,539	4.68
Minnesota	---	336	---	---	72,833	571,605	644,774	9.25
Lake States	---	336	---	---	173,519	928,663	1,102,518	7.21
Ohio	---	25,788	---	---	115,705	255,552	397,045	5.94
Indiana	---	43,680	---	---	84,343	408,548	536,571	7.75
Illinois	127	9	---	5	128,495	616,038	744,674	5.30
Iowa	---	21	---	---	3,852	1,053,781	1,057,654	7.90
Missouri	52,043	7,170	132	1,269	112,124	456,186	628,924	8.60
Corn Belt	52,170	76,668	132	1,274	444,519	2,790,105	3,364,868	6.96
North Dakota	---	---	---	---	584,433	156,624	741,057	18.94
South Dakota	---	---	---	---	180,219	209,095	389,314	11.06
Nebraska	---	---	---	---	238,714	660,971	899,685	12.79
Kansas	---	168	---	---	700,105	330,662	1,030,935	13.30
Northern Plains	---	168	---	---	1,703,471	1,357,352	3,060,991	13.78
Virginia	758	242,222	64,217	---	13,614	44,933	365,744	12.49
West Virginia	---	6,759	---	---	1,014	4,995	12,768	2.54
North Carolina	20,778	1,167,633	125,645	10	22,757	154,119	1,490,942	32.70
Kentucky	323	504,765	---	---	11,414	166,262	682,764	18.64
Tennessee	81,340	197,823	748	138	8,805	121,795	410,649	11.33
Appalachian	103,199	2,119,202	190,610	148	57,604	492,104	2,962,867	19.39

See footnotes at end of table.

--Continued.

APPENDIX TABLE

Capitalized value of farm program benefits, 1970 --Continued

State and region	Cotton 1/	Tobacco 2/	Peanuts 3/	Rice 4/	Wheat 5/	Feed grain 5/	Total values: All listed programs	Total values: As percentage of real estate value
	1,000 dollars							Percent
South Carolina	37,696	201,823	1,419	759	11,690	63,748	317,135	17.74
Georgia	38,181	176,889	211,898	---	8,043	159,700	594,711	15.67
Florida	1,584	36,956	16,161	255	705	34,052	89,714	1.66
Alabama	81,359	1,752	39,704	---	2,643	102,333	227,791	8.65
Southeast	158,820	417,421	269,182	1,014	23,081	359,883	1,229,351	9.02
Mississippi	218,526	---	908	12,446	2,562	61,114	295,556	7.28
Arkansas	151,899	105	507	106,399	5,338	12,762	277,010	6.06
Louisiana	63,040	---	236	126,663	1,643	12,748	204,330	4.36
Delta States	433,465	105	1,651	245,508	9,543	86,624	776,896	6.11
Oklahoma	23,280	---	34,330	40	330,333	73,095	461,078	7.42
Texas	468,423	---	100,566	112,610	271,743	647,238	1,600,580	7.83
Southern Plains	491,703	---	134,896	112,650	602,076	720,333	2,061,658	7.73
Montana	---	---	---	---	325,381	27,257	352,638	9.66
Idaho	---	---	---	---	157,152	10,581	167,733	6.40
Wyoming	---	---	---	---	18,200	4,314	22,514	1.67
Colorado	---	---	---	---	146,671	90,219	236,890	7.40
New Mexico	21,307	---	3,717	---	40,548	59,533	125,105	6.29
Arizona	77,198	---	255	61	4,167	16,152	97,833	4.32
Utah	---	---	---	---	23,548	4,990	28,538	2.72
Nevada	428	---	---	---	2,205	210	2,843	.60
Mountain	98,933	---	3,972	61	717,872	213,256	1,034,094	6.23
Washington	---	---	---	---	235,605	8,062	243,667	6.17
Oregon	---	---	---	---	78,262	7,948	86,210	2.83
California	165,498	---	311	133,222	28,986	49,443	377,460	1.93
Pacific	165,498	---	311	133,222	342,853	65,453	707,337	2.67
48 States	1,503,788	2,614,281	600,754	493,877	4,149,838	7,161,256	16,523,794	7.94

1/ Based on estimates from 1966 Cotton Cost Survey data on transfer prices per pound of allotment.
2/ Per acre values are estimated at $3,000; see (1).
3/ Based on (6); see appendix.
4/ Based on (2) and (4).
5/ Direct payments capitalized at 21 percent, the average ratio for cotton.

REFERENCES

(1) Bradford, Garnell L., and Thompson, James F.
1970. Impact of Eliminating the Tobacco Price Support, Supply Control Program. Processed. Univ. Ky.

(2) Grant, W. E.
1971. Leasing on California Rice Farms. Inf. Ser., No. 71-2, Univ. Calif., AES, Giannini Foundation, ERS, July.

(3) Hardin, Clifford M.
1969. Statement Before the Subcommittee of the Senate Appropriations Committee, June 4, 1969.

(4) Hottel, J. Bruce.
1971. Resource Pricing of Land and Mobile Rice Allotments. Jour. Amer. Soc. Farm Managers and Rural Appraisers. 33: 45-59. Apr.

(5) Mayer, Leo V., Heady, Earl O., and Madsen, Howard C.
1968. Farm Programs for the 1970's. Ctr. for Agr. and Econ. Dev., No. 32, Ames, Iowa. Oct.

(6) Schools, R. C.
1969. 1968 Peanut Allotment Transferrals--Acreage and Estimated Prices by Counties and States. Va. Agr. Ext. Serv. Feb.

(7) Seagraves, James A., and Manning, Richard C.
1967. Flue-Cured Tobacco Allotment Values and Uncertainty. 1934-1962. Econ. Res. Rpt., No. 2, Dept. of Econ., N. C. State Univ. at Raleigh. May.

(8) Starbird, I. R., and French, B. L.
1971. Cost of Producing Upland Cotton in the United States, 1969. Prelim. Rpt., Econ. Res. Serv., U. S. Dept. Agr., Oct.

UNITED STATES DEPARTMENT OF AGRICULTURE
WASHINGTON, D. C. 20250

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF
AGRICULTURE

U.S.MAIL

FIRST CLASS